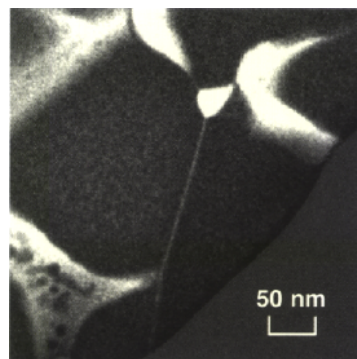


## SHARED RESEARCH EQUIPMENT PROGRAM

**T**he Shared Research Equipment Program (SHaRE) at Oak Ridge National Laboratory (ORNL) provides academic, industrial, and other government researchers access to a singular collection of instruments that are optimized for the evaluation of structure, chemistry, mechanical properties, and related phenomena in materials on a scale of less than one-millionth of an inch (or nano-scale).

SHaRE provides sophisticated analytical electron microscopes, including one with a special imaging filter and two with field-emission guns. These specialized microscopes can identify and map chemical changes in regions as small as one ten-millionth of an inch in diameter. In addition, SHaRE provides access to a fully analytical field-emission scanning electron microscope that includes an automated capability for texture-mapping.

SHaRE's atom probe field ion microscopes are the ultimate tools for analyzing the structure and chemistry of materials. They can analyze individual atoms appearing in atomic-resolution field-ion images. SHaRE mechanical property microprobes can measure the hardness and stiffness of regions less than a ten-thousandth of an inch across.



**Images of nickel-based superalloys showing the distribution of chromium (bright regions) as determined by elemental mapping using a specialized energy-filtered imaging technique.**

### ACCOMPLISHMENTS

Metallic materials containing diamond particles which are being developed for cutting and grinding tool applications have been studied in collaboration with researchers from Southern University and Louisiana State University to extend the tool's service life.

Recent collaborative efforts with Rice University have resulted in the development of an instrumented low-load scratch test for thin films and coatings relevant to the hard disk drive and semiconductor industries.

Collaborations with a variety of industries and universities have focused on the atomic-scale characterization of reactor pressure vessel steels, and have resulted in improved service-life predictions for materials in use in both conventional and nuclear power plants.

**E.L. Hall from General Electric Corporate Research and Development uses a SHaRE analytical electron microscope to investigate nickel-based superalloys used in critical aircraft engine components.**

